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EXAMINER	
BROWN JR, NATHAN H	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/621,079	Applicant(s) WIKIEL ET AL.
	Examiner Nathan H. Brown, Jr.	Art Unit 2121

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12,13-16,17,26-28 and 30-34* is/are rejected.

7)☒ Claim(s) *18-25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

Examiner's Detailed Office Action

1. This Office is responsive to application 10/621079, filed July 16, 2003.

2. Claims 1-34 have been examined.

Claim Objections

3. Claim 17 objected to because of the following informalities: "well performance" should be -- well known performance --. Appropriate correction is required.

4. Claims 6, 8, 9, and 11 are objected to because of the following informalities: "of one or metal" should be -- of one or more metals --.

Claim Rejections - 35 USC § 112, 2nd

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 30 and 31 recite the limitation "said plating solution" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-2, 5, 12, 16-17, 26-28, 30, and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by *Manwaring*, "THE USE OF AN ARTIFICIAL NEURAL NETWORK TO IMPROVE PRECISION IN TRACE LEVEL, QUANTITATIVE ANALYSIS OF HEAVY METAL POLLUTANTS", 1995.

Regarding claim 1. *Manwaring* teaches a process to produce a predictive data set which can be used to predict the property of a plating solution (see Abstract, *Examiner asserts that trace metal pollutants is a property of metal plating solutions.*), said process comprising: (a) obtaining a sample set, wherein each sample comprises a plating solution of good performance (*see* p 376, col. 2, §DATA SET PRODUCTION, para. 1); (b) obtaining an electroanalytical response for each said sample to produce a electroanalytical response data set (*see* p 376, col. 1, §ANODIC STRIPPING VOLTAMMETRY); (c) obtaining a training set that comprises said sample set and

corresponding said electroanalytical response data set (*see* p 376, col. 2, §DATA SET PRODUCTION, para. 2, "The data set was split into three groups…"); (d) analyzing said training set using decomposition method (*see* p. 377, col. 1, §CALIBRATION METHODS IMPLEMENTED, para. 2, " For the neural network models…", *Examiner asserts that the decomposition method reduced each data point to a 17 element vector.*) coupled with discriminant analysis method to produce a discriminant parameters data set (*see* p. 378, col. 1, § RESULTS, para. 2, Examiner provides Official Notice that MLPs are capable of discriminant analysis (see Rudorfer, "Early Bankruptcy Detection Using Neural Networks" (http://godefroy.sdf-eu.org/apl95/), 1995, §Motivation, "The relationships between statistical discriminant analysis and multilayered perceptrons (MLPs) shows the evidence of generic properties of MLPs classifiers [GTBFS91]. In other words, linear MLPs can be trained to perform mean square classification to discriminant analysis.").); and (e) validating said training data set to produce said predictive data set for a predictive model (*see* p. 377, col. 2, § RESULTS, para. 1, "A plot of the actal concentration vs the predicted concentration…", *Examiner interprets the plot and the regression analysis constitute data validation.*).

Regarding claim 2. *Manwaring* teaches a process wherein said property is selected from the group consisting of: a concentration of individual component of said electroplating bath; an amount of breakdown products accumulated in said electroplating bath; an amount of foreign contaminants accumulated in said electroplating bath; a temperature of said electroplating bath; a quantity of hysteresis on recorded voltammogram; or combinations thereof (*see* p. 379, col. 1, "Each of these four sets was then processed to obtain a prediction of test set lead

concentration…", *Examiner asserts that lead concentration is "a concentration of individual component of said electroplating bath".*).

Regarding claim 5. *Manwaring* teaches a process, wherein said plating solution is an electroplating bath (*see* p 376, col. 1, "In DPASV the solution under test is placed in a specially constructed cell…", *Examiner asserts that the solution may be either river water or a sample from an electroplating bath.*).

Regarding claim 12. *Manwaring* teaches a process, wherein the sample set of step (a) comprises plating solutions of known concentration within specification range (*see* p. 376, col. 2, §DATA SET PRODUCTION, "For this study standard solutions containing lead at concentrations of 0 to 200 ppb in steps of 10 ppb were made up by dissolving lead nitrate in nitric acid.").

Regarding claim 16. *Manwaring* teaches a process, wherein the sample set of step (a) comprises freshly prepared electroplating solutions of known concentration within specification range (*see* p. 376, col. 2, §DATA SET PRODUCTION, "For this study standard solutions … were made up by dissolving lead nitrate in nitric acid.", *Examiner interprets "made up" to mean freshly prepared.*).

Regarding claim 17. *Manwaring* teaches a process, wherein said sample set of step (a) comprises industrial plating solutions with well known performance (empirical sample set) (*see* above,

Examiner interprets "standard solutions" to mean industrial plating solutions with well known performance. Furthermore, heavy metal pollutants are the by-product of industrial plating processes.).

Regarding claim 26. *Manwaring* teaches a process, wherein said electranalytical response of step (b) comprises a plurality of data points (*see* p. 376, col. 2, §DATA SET PRODUCTION, "The resulting database therefore consisted of 328 voltammograms each of which contained 300 Δi data points.").

Regarding claim 27. *Manwaring* teaches a process, wherein said electroanalytical response of step (b) is a combination of one or more portions of a complete electroanalytical response (*see* p. 376, col. 2, §DATA SET PRODUCTION, "Four scans were made of each solution using DPASV at pulse heights (E_p) of 5, 10,20 and 50 mV and a deposit time (t_p) of 60s.", *Examiner interprets different pulse height scans for a constant deposit time to be one or more portions of a complete electroanalytical response for a solution.*).

Regarding claim 28. *Manwaring* teaches a process, wherein said electroanalytical response of step (b) comprises a combination of one or more portions of independent electroanalytical responses (*see* p. 376, col. 2, §DATA SET PRODUCTION, "This entire process was then repeated using new solutions and with a deposition time of 180s.", *Examiner interprets the repeat of the above process for a new solution and different deposit time to be one or more portions of independent electroanalytical responses.*).

Regarding claim 30. *Manwaring* teaches a process to predict a property of a plating solution (see Abstract, *Examiner asserts that trace metal pollutants is a property of metal plating solutions.*), said process comprising:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance (*see* p 376, col. 2, §DATA SET PRODUCTION, para. 1);

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set (*see* p 376, col. 1, §ANODIC STRIPPING VOLTAMMETRY);

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set (*see* p 376, col. 2, §DATA SET PRODUCTION, para. 2, "The data set was split into three groups...");

(a4) preprocessing of said electronalytical response data set (*see* p. 379, col. 1, para. 2, "The file containing data from unsaturated peaks was first randomized...", *Examiner interprets the randomization of the data from unsaturated peaks to be preprocessing of electronalytical response data set.*);

(a5) analyzing said training set using decomposition method (*see* p. 377, col. 1, §CALIBRATION METHODS IMPLEMENTED, para. 2, " For the neural network models...", *Examiner asserts that the decomposition method reduced each data point to a 17 element vector.*) coupled with discriminant analysis method to produce a discriminant parameters data set (*see* p. 378, col. 1, § RESULTS, para. 2, Examiner provides Official Notice that MLPs are capable of discriminant analysis (see Rudorfer, "Early Bankruptcy Detection Using Neural Networks" (http://godefroy.sdf-eu.org/apl95/), 1995, §Motivation, "The relationships between

statistical discriminant analysis and multilayered perceptrons (MLPs) shows the evidence of generic properties of MLPs classifiers [GTBFS91]. In other words, linear MLPs can be trained to perform mean square classification to discriminant analysis.").);

(a6) validating said training data set to produce said predictive data set for a predictive model (*see* p. 377, col. 2, § RESULTS, para. 1, "A plot of the actal concentration vs the predicted concentration…", *Examiner interprets the plot and the regression analysis constitute data validation.*); and

(b) using said predictive data set to predict the property of said plating solution, said property predicted by:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution (*see* p. 379, col. 1, §CROSS VALIDATION EXERCISE, para. 2, *Examiner interprets "data from unsaturated peaks" to be an unknown sample set.*);

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set (*see* above, *Examiner asserts that "data from unsaturated peaks" is electroanalytical response data.*);

(b3) preprocessing of said electronalytical response data set (*see* p. 379, col. 1, para. 2, "The file containing data from unsaturated peaks was first randomized…", *Examiner interprets the randomization of the data from unsaturated peaks to be preprocessing of electronalytical response data set.*); and

(b4) applying said predictive model to predict property of each said unknown sample (*see* p. 379, col. 1, para. 4).

9. Claim 34 is rejected under 35 U.S.C. 102(b) as being anticipated by *Naidu et al.*, "Use of Neural Networks for Sensor Failure Detection in a Control System", 1990.

Regarding claim 34. *Naidu et al.* teach a method of monitoring of performance of measuring system in order to detect its malfunctioning, said process comprising the steps of:

(a) producing a predictive data set (*see* p. 51, Fig. 3, *Examiner interprets the diagnostic signal, z'(t), to be a predictive data set.*), the predictive data set generated by:

(a1) obtaining a training set, wherein each sample comprises an electronic characteristic of a measurement system of good performance (*see* p. 51, col. 3, §Input/Output Pair, *Examiner interprets calibration data to comprises an electronic characteristic of a measurement system of good performance.*);

(a2) preprocessing of said training data set (*see* p. 51, col. 3, §Input/Output Pair, *Examiner interprets input cosine transform scaling as preprocessing of training data.*);

(a3) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set (*see* Official Notice above);

(a4) validating said training data set to produce said predictive data set for a predictive model (*see* p. 53, col. 3, §Nearest-Neighbor Method, *Examiner asserts that nearest neighbor classification should result in the expected partitioning of the diagnostic signal data vectors into supercritical and subcritical fault indications.*); and

(a5) defining the limits of said property for said electronic characteristic of the well performed measurement system (*see* p. 50, col. 2, "The largest steady-state fractional error caused by a sensor failure in the IMC control system…" to p. 50, col. 2, "Hence, we limit the signals used in

the tests to those created by sensor failures up to twice the magnitude of the critical limit…");

and

(b) using said predictive data set to predict the malfunctioning of measurement system said process comprises:

(b1) obtaining a second data set, wherein each sample comprises an a periodically taken electronic characteristic of a measurement system (*see* p. 51, col. 3, "The calibration data base is composed of continuous, random samples drawn from S, whereas the test data base is a fixed discrete set of 2048 samples, also drawn from S.", *Examiner interprets "the test data base" to be a second data set which can be drawn non-randomly.*);

(b2) preprocessing of said second data set (*see* above);

(b3) applying said predictive model to predict property of each sample of a second data set (*see* p. 51, col. 3, "The learning process was periodically interrupted between 250 presentations of the calibration patterns, and diagnostics were generated on the fixed test set. Test as well as calibration diagnostics were monitored throughout the usage of the neurocomputer.", *Examiner interprets the "250 presentations of the calibration patterns" to generate the predictive model and the diagnostics generated on the fixed test set during the periodic interruptions of presentations of the calibration patterns to be applying said predictive model to predict property of each sample of a second data set.*); and

(b4) detecting malfunctioning of measurement system by qualifying said property as a fault (*see* p. 52, col. 1, "Diagnostics performed by the trained network on 2048 random samples appear in Fig. 4, while the corresponding result for the test set is shown in Fig. 5.", *Examiner asserts that*

Fig. 4 shows the mapping (qualifying) of sensor diagnostic signals (said property) to fault status where fault status > 0.95 indicates supercritical failures (i.e., malfunctioning).).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Manwaring* in view of *Wong et al.*, "Metallization by plating for high-performance multichip modules", (http://www.research.ibm.com/journal/rd/425/wong.html), 1998.

Regarding claim 3. *Manwaring* teaches a process according to claim 1 (see above). *Manwaring* does not teach the process according to claim 1, wherein said property comprises an overall plating performance. However, *Wong et al.* do teach the process according to claim 1 wherein said property comprises an overall plating performance (*see* §Electrolytic plating through resist, "Table 1 summarizes the key plating requirements in plating-through masks."). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Wong et al.* to predict the overall plating performance from key metallurgical properties of the plated metal controlled by the chemistry of the plating bath.

Regarding claim 4. *Manwaring* teaches a process according to claim 1 (*see* above). *Manwaring* does not teach the process according to claim 3, wherein said overall plating performance is selected from the group consisting of: throwing power; brightness of the deposit; tensile strengths of the deposit; ductility of the deposit; internal stress of the deposit; solderability performance; resistance to thermal shock; uniformity of the deposit; capability of uniform filling through holes; capability of filling submicron features in a substrate surface; and combinations thereof. *Wong et al.* do teach the process according to claim 3, wherein said overall plating performance is high ductility (*see* §Electrolytic plating through resist, Table 1). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Wong et al.* to predict the overall plating performance from by predicting the ductility of the deposit from measurements of bath composition.

12. Claims 7, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Manwaring* in view of *Koslov et al.* (USPN 6391477 B1).

Regarding claim 7. *Manwaring* teaches a process according to claim 1 (*see* above). *Manwaring* does not teach the process, wherein said plating solution is an electroless plating bath. However, *Koslov et al.* teach the process, wherein said plating solution is an electroless plating bath (*see* col. 4, lines 4-6, "The present invention provides a process for uniformly plating various substrates with metallic platinum using an electroless plating bath.".). It would have been

obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Koslov et al.* to avoid the extra costs of activating a catalytically inactive substrate in creating a bath for analysis.

Regarding claim 8. *Manwaring* teaches a process according to claim 1 (*see* above). *Manwaring* does not teach the process of claim 7, wherein said electroless plating bath comprises an autocatalytic plating bath of one or metal selected from the following group: Cu, Sn, Pb, Ni, Ag, Au, and/or their alloys. *Koslov et al.* teach the process of claim 7, wherein said electroless plating bath comprises an autocatalytic plating bath of one or more metals selected from the following group: Cu, Sn, Pb, Ni, Ag, Au, and/or their alloys (*see* col. 4, lines 39-41, "The process is autocatalytic, in that no catalyst separate from the aforementioned components is required to advance the platinum deposition onto catalytically active surfaces…", col. 4, lines 66-67, "Typically the substrate remains in the plating bath for from about 1 minute to about four hours…", and col. 5, lines 40-42, "Suitable metal substrates include … nickel … and nickel-chromium-iron alloys.".). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Koslov et al.* to avoid the extra costs of activating a catalytically inactive substrate in creating a bath for analysis.

Regarding claim 9. *Manwaring* teaches a process according to claim 1 (*see* above). *Manwaring* does not teach the process of claim 7, wherein said electroless plating bath comprises an immersion plating bath of one or more metals selected from the following group: Cu, Sn, Pb, Ni,

Ag, Au and/or their alloys. However, *Koslov et al.* teach the process of claim 7, wherein said electroless plating bath (*see* above) comprises an immersion plating bath (*see* col. 4, lines 47-48, "Following formation of the plating bath, a suitable substrate is immersed in the bath for plating.") of one or metal selected from the following group: Cu, Sn, Pb, Ni, Ag, Au and/or their alloys (*see* above). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Koslov et al.* to avoid the extra costs of activating a catalytically inactive substrate in creating a bath for analysis.

13. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Manwaring* in view of *Jordanov et al.*, "A study of the morphological aspects of the indium electrorefining process", 2001, J.Serb.Chem.Soc. 66(11–12)913–921(2001).

Regarding claim 10. *Manwaring* teaches a process of claim 1. *Manwaring* does not teach the process of claim 1, wherein said plating solution is selected from the group consisting of: an electrowinning bath; an electrorefining bath; an electropolishing bath; an electroforming bath; or an electromicromachining bath. *Jordanov et al.* teach the process of claim 1, wherein said plating solution is an electrorefining bath (*see* p. 914, EXPERIMENTAL, "Electrorefining of indium was performed…"). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Jordanov et al.* as a means to obtaing 'ultrapurification' of metal deposits.

14. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Manwaring* in view of *Simpson et al.,* "Metamodels for Computer-based Engineering Design: Survey and recommendations", 2001.

Regarding claim 13. *Manwaring* teaches a process according to claim 1 (see above). *Manwaring* does not teach the process according to claim 1 wherein the sample data set of step (a) is obtained by design of experiment (DOE) routines. However, *Simpson et al.* do teach the process according to claim 1 wherein the sample data set of step (a) is obtained by design of experiment (DOE) routines (*see* p. 129, col. 2, §Introduction, "The most common metamodeling approach is to apply the design of experiments (DOE) to identify an efficient set of computer runs ($\mathbf{x}_1$, $\mathbf{x}_2$, . . .,$\mathbf{x}_n$)...", *Examiner interprets the vectors $\mathbf{x}_i$ to be sample data.*). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Simpson et al.* as a means to obtain a sample data set.

Regarding claim 14. *Manwaring* teaches a process according to claim 1 (see above). *Manwaring* does not teaches a process according to claim 13, wherein said DOE routine is multicomponent multilevel linear orthogonal array. *Simpson et al.* do teach a process according to claim 13, wherein said DOE routine is multicomponent multilevel linear orthogonal array (*see* p. 131, col. 2, para. Orthogonal Arrays:). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Simpson et al.* as a means to obtain a sample data set.

Regarding claim 15. *Manwaring* teaches a process according to claim 1 (see above). *Manwaring* does not teaches a process according to claim 13, wherein said DOE routine is multicomponent multilevel fractional factorial. *Simpson et al.* do teach a process according to claim 13, wherein said DOE routine is multicomponent multilevel fractional factorial (*see* p. 130, col. 2 to p. 131, col. 1, para. Factorial Designs:). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Simpson et al.* as a means to obtain a sample data set.

15. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Manwaring* in view of *Ormoneit et al.,* "Learning and Tracking Human Motion Using Functional Analysis", 2000.

Regarding claim 29. *Manwaring* teaches a process of claim 1. *Manwaring* does not teach a process of claim 1, wherein said decomposition method of step (d) is selected from the group of: Principal Component Analysis (PCA); calculation of Mahalanobis Distance (MD); calculation of Mahalanobis Distance with residuals (MDR); calculation by Simple Modeling of Class Analogy (SIMCA); calculation of F.sup.s ratio; internal validation; external validation; an combinations thereof. However, *Ormoneit et al.* does teach a decomposition method for analyzing training data using PCA (*see* p. 2, cols 1 and 2, §2 Related Work, "The variation across subjects is modeled by principal component analysis (PCA) of the curve data. Here the first few principal components capture most of the variation in the training set."). It would have been obvious at the

time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Ormoneit et al.* as a means of analyzing variation across training set solution samples .

16. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Manwaring* in view of *Battaglia,* "Regression-Based Statistical Process Control", 1993.

Regarding claim 31. *Manwaring* teaches a process to detect faulty performance of said plating solution, said process comprising:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance (*see* p 376, col. 2, §DATA SET PRODUCTION, para. 1);

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set (*see* p 376, col. 1, §ANODIC STRIPPING VOLTAMMETRY);

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set (*see* p 376, col. 2, §DATA SET PRODUCTION, para. 2, "The data set was split into three groups…");

(a4) preprocessing of said electronalytical response data set (*see* p. 379, col. 1, para. 2, "The file containing data from unsaturated peaks was first randomized…", *Examiner interprets the randomization of the data from unsaturated peaks to be preprocessing of electronalytical response data set.*);

(a5) analyzing said training set using decomposition method (*see* p. 377, col. 1, §CALIBRATION METHODS IMPLEMENTED, para. 2, " For the neural network models…", *Examiner asserts that the decomposition method reduced each data point to a 17 element*

vector.) coupled with discriminant analysis method to produce a discriminant parameters data set (*see* p. 378, col. 1, § RESULTS, para. 2, Examiner provides Official Notice that MLPs are capable of discriminant analysis (see Rudorfer, "Early Bankruptcy Detection Using Neural Networks" (http://godefroy.sdf-eu.org/apl95/), 1995, §Motivation, "The relationships between statistical discriminant analysis and multilayered perceptrons (MLPs) shows the evidence of generic properties of MLPs classifiers [GTBFS91]. In other words, linear MLPs can be trained to perform mean square classification to discriminant analysis.").);

(a6) validating said training data set to produce said predictive data set for a predictive model (*see* p. 377, col. 2, § RESULTS, para. 1, "A plot of the actal concentration vs the predicted concentration…", *Examiner interprets the plot and the regression analysis constitute data validation.*); and

(b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution (*see* p. 379, col. 1, §CROSS VALIDATION EXERCISE, para. 2, *Examiner interprets "data from unsaturated peaks" to be an unknown sample set.*);

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set (*see* above, *Examiner asserts that "data from unsaturated peaks" is electroanalytical response data.*);

(b3) preprocessing of said electronalytical response data set (*see* above);

(b4) applying said predictive model to predict property of each said unknown sample (*see* p. 51, col. 3, "The learning process was periodically interrupted between 250 presentations of the

calibration patterns, and diagnostics were generated on the fixed test set. Test as well as calibration diagnostics were monitored throughout the usage of the neurocomputer.", *Examiner interprets the "250 presentations of the calibration patterns" to generate the predictive model and the diagnostics generated on the fixed test set during the periodic interruptions of presentations of the calibration patterns to be applying said predictive model to predict property of each sample of a second data set.*).

Manwaring does not teach:

(a7) specifying the limits of good and faulty performance of said plating solution; or

(b5) qualifying said unknown samples as correct or faulty.

However, *Battaglia* teaches:

(a7) specifying the limits of good and faulty performance of said plating solution (*see* p. 40, col. 2, para. 2 to p. 41, col. 1, para. 4); or

(b5) qualifying said unknown samples as correct or faulty (*see* p. 38, col. 2, §MATHEMATICAL FRAMEWORK AND PROCESS MODEL, *Examiner interprets "a product measurement or sample average", x, to be a unknown sample measurement.*).

It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Battaglia* to provide a means to detect faulty plating solution performance.

17. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Manwaring in view of *Plotech*, "Manufacturing Process Standardization", 2001.

Regarding claim 32. *Manwaring* teaches a method of monitoring performance of plating solution in order to perform controlled feed and bleed procedure, said process comprising the steps of:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance (*see* claim 31 (a1));

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set (*see* claim 31 (a2));

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set (*see* claim 31 (a3));

(a4) preprocessing of said electronalytical response data set (*see* claim 31 (a4));

(a5) analyzing said training set using decomposition method coupled with discriminant analysis method to produce a discriminant parameters data set (*see* claim 31 (a5));

(a6) validating said training data set to produce said predictive data set for a predictive model (*see* claim 31 (a6)); and

(b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution (*see* claim 31 (b1));

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set (*see* claim 31 (b2));

(b3) preprocessing of said electronalytical response data set (*see* claim 31 (b3));

(b4) applying said predictive model to predict property of each said unknown sample (*see* claim 31 (b4)).

Manwaring does not teach:

(a7) defining the limits of said property for said plating solution that requires feed and bleed procedure; or

(b5) qualifying said unknown samples as a ready or not ready solution for feed and bleed procedure.

However, *Plotech* teaches:

(a7) defining the limits of said property for said plating solution that requires feed and bleed procedure (*see* p. 1, "For our automatic plating line, Plotech's developing, etching and peeling machines are automatic feed and bleed control systems for chemical concentrates and PH balancing solutions that use each ingredient's specific gravity to determine their respective quantities. These lines are precisely tuned to allow measured quantities automatically instill into the solution bath dependent on the desired bath mixture, temperature, timing and speed .", *Examiner asserts that each ingredient's specific gravity limits its respective quantity in lines precisely tuned to allow measured quantities automatically.*); or

(b5) qualifying said unknown samples as a ready or not ready solution for feed and bleed procedure (*see* p. 1, *Examiner asserts that "chemical concentrates and PH balancing solutions" are unknown samples which will be deemed ready or not for automatic instilling "into the solution bath dependent on the desired bath mixture, temperature, timing and speed ."*).

It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *Plotech* to provide a means of monitoring the performance of a plating solution in order to perform controlled feed and bleed procedure to balance solution PH.

18. Claims 6, 11, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Manwaring* in view of N.C. Division of Pollution Prevention and Environmental Assistance (*NCDPPEA*), "Metal Finishing Industry, Chapter: Pollution Prevention in the Plating Process", July 11, 2002.

Regarding claims 6 and 11. *Manwaring* teaches a process of claims 1 and 10, respectively. However, *Manwaring* does not teach a process of claims 1 or 10, wherein said electroplating bath comprises a plating bath of one or metal selected from the following group: Cu, Sn, Pb, Zn, Ni, Ag, Cd, Co, Cr, and/or their alloys. *NCDPPEA* does teach an electroplating baths comprising: Cu, Sn, Zn, Ni, Ag, and Cd (*see* pp. 54-55, §Immersion (Displacement) Plating). It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *NCDPPEA* to provide a means of monitoring pollutants in river waters containing the bleed off of such baths.

Regarding claim 33. *Manwaring* teaches a method of monitoring performance of electroplating solution in order to perform controlled purification treatment procedure, said process comprising the steps of:

(a) producing a predictive data set, the predictive data set generated by:

(a1) obtaining a sample set, wherein each sample comprises an electrolyte solution of good performance (*see* claim 31 (a1));

(a2) obtaining an electroanalytical response for each said sample to produce an electroanalytical response data set (*see* claim 31 (a2));

(a3) obtaining a training set that comprises said sample set and corresponding said electroanalytical response data set (*see* claim 31 (a3));

(a4) preprocessing of said electronalytical response data set (*see* claim 31 (a4));

(a5) analyzing said training set using decomposition method (see claim 31 (a5)) coupled with discriminant analysis method to produce a discriminant parameters data set (*see* claim 31 (a5));

(a6) validating said training data set to produce said predictive data set for a predictive model (*see* claim 31 (a6)); and

(b) using said predictive data set to predict the property of said plating solution and qualify said solution as correct or faulty said process comprises:

(b1) obtaining an unknown sample set, wherein each unknown sample in said unknown sample set contains a plating solution (*see* claim 31 (b1));

(b2) obtaining an electroanalytical response for each said unknown sample to produce an electroanalytical response data set (*see* claim 31 (b2));

(b3) preprocessing of said electronalytical response data set (*see* claim 31 (b3)); and

(b4) applying said predictive model to predict property of each said unknown sample (*see* claim 31 (b4)).

Manwaring does not teach:

(a7) defining the limits of said property for said plating solution that requires purification treatment; or

(b5) qualifying said unknown samples as ready or not ready for purification treatment.

However, *NCDPPEA* teaches:

(a7) defining the limits of said property for said plating solution that requires purification treatment (*see* pp. 1-3, *Examiner asserts that limits of said property for said plating solution are defined by supplier provided "optimum operating parameters" for solutions, vendor sampling of solutions "on a monthly basis" and plater's "daily analyses" (see heuristics provided by bath).*); and

(b5) qualifying said unknown samples as ready or not ready for purification treatment (*see* above, *Examiner asserts that qualifying said unknown samples as ready or not ready for purification treatment is done by vendor sampling of solutions on a monthly basis and plater's daily analyses.*).

It would have been obvious at the time the invention was made to persons having ordinary skill in the art to combine *Manwaring* with *NCDPPEA* to provide a means to monitor performance of an electroplating solution in order to perform controlled purification.

Allowable Subject Matter

13. Claims 18-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan H. Brown, Jr. whose telephone number is 571-272- 8632. The examiner can normally be reached on M-F 0830-1700. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 571-272-3687. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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